

09/884,429 filed 06/18/2001
David Chazan, et al.
Reply to Final Office Action of November 9, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-12. (cancelled)

13. (currently amended) A fabrication element comprising a body structure formed by bonding together at least a first and a second substrate, at least one of the first and second substrates having at least one venting element disposed therein or at least partially therethrough to vent bond voids between the bonded substrates, the venting element having no fluid communication with functionalized regions of the fabrication element, wherein the at least one venting element thermally insulates at least a first portion of the body structure from at least a second portion of the body structure, thereby reducing thermal coupling between the first and second portions, and wherein the at least one venting element produces at least one stagnant vapor region that reduces convective transport between venting element surfaces.

14-27. (cancelled)

28. (currently amended) The fabrication element of claim ~~29~~ 79, wherein a volume of at least one of the plurality of venting cavities is at least about $1 \mu\text{m}^3$.

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29. (currently amended) A fabrication element comprising a body structure having at least one venting element disposed therein or at least partially therethrough, the venting element having no fluid communication with functionalized regions of the fabrication element, wherein the at least one venting element thermally insulates at least a first portion of the body structure from at least a second portion of the body structure, thereby reducing thermal coupling between the first and second portions, wherein at least one of the first and second portions further comprises at least one cavity disposed therein, wherein the at least one cavity comprises at least one microchannel network, ~~wherein the at least one venting element comprises at least one venting channel network, a plurality of venting cavities, or both, disposed in the body structure and wherein a depth of at least one of the plurality of venting cavities is at least about 0.1 μm .~~

30. (currently amended) The fabrication element of claim ~~29~~ 79, ~~wherein the venting element comprises the plurality of venting cavities, and wherein each of the plurality of venting cavities is spaced at least about 10 μm apart from one another.~~

31. (currently amended) The fabrication element of claim ~~29~~ 79, ~~wherein the venting element comprises the plurality of venting cavities, and wherein each of the plurality of venting cavities is spaced at least about 5 μm from an edge of a nearest microchannel or a nearest port.~~

32. (cancelled)

33. (currently amended) The fabrication element of claim 29, wherein the venting element comprises ~~the~~ at least one venting channel network, and wherein at least one venting channel of the at least one venting channel network is disposed along at least a portion of and substantially parallel to one or more sides of one or more microchannels in the at least one microchannel network.

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34. (currently amended) The fabrication element of claim 29, wherein the venting element comprises ~~the~~ at least one venting channel network, and wherein the at least one venting channel network comprises at least a first venting channel network, at least one venting channel of which is disposed proximal to a first side of one or more microchannels in the at least one microchannel network.

35. (original) The fabrication element of claim 34, further comprising at least a second venting channel network, at least one venting channel of which is disposed proximal to a second side of one or more microchannels in the at least one microchannel network.

36. (original) The fabrication element of claim 35, wherein the at least one venting channel of the first and second venting channel networks are disposed substantially parallel to the one or more microchannels in the at least one microchannel network.

37. (original) The fabrication element of claim 35, wherein the at least one venting channel of the first and second venting channel networks terminate at least about 0.05 mm from an edge of a port when the one or more microchannels in the microchannel network fluidly communicate with the port.

38. (original) The fabrication element of claim 35, wherein the at least one venting channel of the first and second venting channel networks each comprises a width of at least about 5 μm .

39. (original) The fabrication element of claim 35, wherein two or more venting channels in the first or second venting channel networks merge in regions where cross-sectional midpoints of the two or more venting channels are separated by at most about 50 μm .

40. (original) The fabrication element of claim 35, wherein cross-sectional midpoints of the at least one venting channel of the first and second venting channel

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networks are each disposed at least about 60 μm from a cross-sectional midpoint of the one or more microchannels in the at least one microchannel network.

41. (original) The fabrication element of claim 40, wherein the one or more microchannels comprise a width of at least about 60 μm .

42. (original) The fabrication element of claim 35, wherein one or more edges of the body structure comprise at least a third venting channel network comprising one or more venting channels.

43. (original) The fabrication element of claim 42, wherein the one or more venting channels comprise widths of at least about 0.1 mm.

44. (original) The fabrication element of claim 42, wherein the one or more venting channels are disposed at least about 3 mm from the one or more edges of the body structure.

45. (original) The fabrication element of claim 42, wherein one or more venting channels of the first and second venting channel networks fluidly communicate with the third venting channel network.

46. (withdrawn) A method of fabricating a body structure, the method comprising:

forming at least a first and a second substrate, wherein at least one of the first and second substrates comprises at least one venting element, or a portion thereof, disposed thereon or therethrough; and,

bonding the first and second substrates together to form the body structure.

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47. (withdrawn) The method of claim 46, comprising providing the first and second substrates to be substantially planar and the bonding step to comprise heat laminating, adhering, welding, or clamping the first and the second substrates together to form the body structure.

48. (withdrawn) The method of claim 46, further comprising dividing the body structure to form a plurality of body structures.

49. (withdrawn) The method of claim 48, wherein each of the plurality of body structures comprises a microfluidic device.

50. (withdrawn) The method of claim 48, comprising dividing the body structure by cutting, scoring, breaking, or etching the body structure.

51. (withdrawn) The method of claim 46, wherein the at least one venting element thermally insulates at least a first portion of the body structure from at least a second portion of the body structure, thereby reducing thermal coupling between the first and second portions.

52. (withdrawn) The method of claim 51, wherein the at least one venting element is disposed in the body structure and produces at least one stagnant vapor region that reduces convective transport between venting element surfaces.

53. (withdrawn) The method of claim 51, wherein the body structure comprises the at least one venting element disposed at least partially therethrough and the method further comprises bonding at least one additional substrate over at least a segment of the at least one venting element to produce at least one stagnant vapor region that reduces convective transport between venting element surfaces.

54. (withdrawn) The method of claim 51, wherein at least one of the first and second portions further comprises at least one cavity disposed therein.

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55. (withdrawn) The method of claim 54, wherein the at least one cavity comprises a plurality of cavities, wherein at least two adjacent cavities comprise one or more venting elements disposed therebetween.

56. (withdrawn) The method of claim 46, wherein the at least one of the first and second substrates further comprises at least one cavity, or a portion thereof, disposed thereon.

57. (withdrawn) The method of claim 56, further comprising fabricating one or more ports through at least one of the first or second substrates such that at least one of the one or more ports fluidly communicates with the at least one cavity.

58. (withdrawn) The method of claim 56, further comprising fabricating one or more ports through at least one of the first or second substrates such that at least one of the one or more ports fluidly communicates with the at least one venting element.

59. (withdrawn) The method of claim 56, wherein the body structure comprises at least one microfluidic device.

60. (withdrawn) The method of claim 56, comprising fabricating the at least one venting element to comprise at least one venting channel network, a plurality of venting cavities, or both.

61. (withdrawn) The method of claim 60, comprising fabricating each of the plurality of venting cavities to comprise regularly or irregularly shaped cavities, each cavity comprising three dimensions, wherein two of the three dimensions together form a shape comprising a triangle, a square, a rectangle, a trapezoid, a regular n-sided polygon, an irregular n-sided polygon, a circle, or an oval.

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62. (withdrawn) The method of claim 60, comprising fabricating each of the plurality of venting cavities at least about 5 μm from an edge of a nearest microchannel or a nearest port.

63. (withdrawn) The method of claim 60, comprising fabricating each of the plurality of venting cavities at regular or irregular intervals from one another.

64. (withdrawn) The method of claim 63, wherein the intervals comprise at least about 10 μm .

65. (withdrawn) The method of claim 60, comprising fabricating the at least one cavity to comprise at least one microchannel network.

66. (withdrawn) The method of claim 65, comprising fabricating the at least one venting channel network to comprise at least a first venting channel network, at least one venting channel of which is disposed proximal to a first side of one or more microchannels in the at least one microchannel network.

67. (withdrawn) The method of claim 66, further comprising fabricating at least a second venting channel network, at least one venting channel of which is disposed proximal to a second side of the one or more microchannels in the at least one microchannel network.

68. (withdrawn) The method of claim 67, comprising fabricating the at least one venting channel of the first and second venting channel networks to be disposed substantially parallel to the one or more microchannels.

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69. (withdrawn) The method of claim 67, comprising fabricating the at least one venting channel of the first and second venting channel networks to terminate at least about 0.05 mm from an edge of a port when the one or more microchannels fluidly communicate with the port.

70. (withdrawn) The method of claim 67, comprising fabricating the at least one venting channel of the first and second venting channel networks to each comprise a width of at least about 5 μm .

71. (withdrawn) The method of claim 67, comprising fabricating the at least one venting channel of the first and second venting channel networks to each comprise cross-sectional midpoints disposed at least about 60 μm from a cross-sectional midpoint of the one or more microchannels.

72. (withdrawn) The method of claim 71, comprising fabricating the one or more microchannels to comprise a width of at least about 60 μm .

73. (withdrawn) The method of claim 67, comprising merging two or more venting channels in the first or second venting channel networks in regions where cross-sectional midpoints of two or more venting channels are separated by less than about 50 μm .

74. (withdrawn) The method of claim 67, comprising fabricating at least a third venting channel network comprising one or more venting channels proximal to one or more edges of the body structure.

75. (withdrawn) The method of claim 74, comprising fabricating the one or more venting channels to comprise widths of at least about 0.1 mm.

76. (withdrawn) The method of claim 74, comprising fabricating the one or more venting channels at least about 3 mm from the one or more edges of the body structure.

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77. (withdrawn) The method of claim 74, comprising fabricating one or more venting channels of the first and second venting channel networks to be in fluid communication with the third venting channel network.

78. (canceled)

79. (new) The fabrication element of claim 29, wherein the venting element comprises a plurality of venting cavities.

80. (new) The fabrication element of claim 79, wherein a depth of at least one of the plurality of venting cavities is at least about 0.1 μm

81. (new) A fabrication element comprising a body structure formed by bonding together at least a first and a second substrate, at least one of the first and second substrates having at least one venting channel network disposed therein to vent bond voids between the bonded substrates, the venting channel network having no fluid communication with functionalized regions of the fabrication element.

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